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(19) (CA) **APPLICATION FOR CANADIAN PATENT** (12)

(54) Hockey Stick

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(57) 6 Claims

Notice: This application is as filed and may therefore contain an incomplete specification.



## ABSTRACT OF THE DISCLOSURE

A hockey stick includes a blade with a heel portion, and a metal hollow shaft that extends upwardly from the heel portion of the blade. The hollow shaft has a  
5 rectangular cross-section and an outer surrounding wall surface with four corner portions, a pair of longer sides and a pair of shorter sides. At least one of the longer and shorter sides is formed with a longitudinally extending recess that is disposed  
10 between a corresponding two of the corner portions and that receives fittingly a respective reinforcing strip, which is made of a composite material, therein.

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HOCKEY STICK

## FIELD OF THE INVENTION

The invention relates to a hockey stick, more particularly to a hockey stick which includes a hollow shaft that is made of metal and that has a reinforcing strip made of a composite material secured thereon.

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## BRIEF DESCRIPTION OF THE DRAWINGS

In drawings which illustrate embodiments of the invention,

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Figure 1 is a schematic view of a conventional hockey stick;

Figure 2 is a sectional view of a metal hollow shaft for a conventional hockey stick;

Figure 3 is a sectional view of a composite hollow shaft for a conventional hockey stick;

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Figure 4 is a sectional view of another hollow shaft for a conventional hockey stick, the hollow shaft being made from both metal and composite material;

Figure 5 is a schematic view of the first preferred embodiment of a hockey stick according to the present invention;

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Figure 6 is a sectional view of the first preferred embodiment, taken along line VI-VI in Figure 5;

Figure 7 is an enlarged view of an encircled portion found in Figure 6;

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Figure 8 is a sectional view of a hollow shaft of the second preferred embodiment of a hockey stick

according to the present invention; and

Figure 9 is a sectional view of a hollow shaft of the third preferred embodiment of a hockey stick according to the present invention.

5 BACKGROUND OF THE INVENTION

Referring to Figure 1, a conventional hockey stick 10 is shown to comprise a blade 11 and a hollow shaft 12 that extends angularly upward from a heel portion of the blade 11. The hollow shaft 12 has a rectangular cross-section. There are three types of hollow shafts 12 currently available in the market. In the first type, the hollow shaft 13 is made entirely from metal, as shown in Figure 2. The metal hollow shaft 13 is usually heavy, thereby resulting in increased 15 difficulty when handling the same. If the hollow shaft 13 is made of a lighter metal material, the hollow shaft 13 is less rigid, thereby resulting in poorer strength. In the second type, the hollow shaft 14 is made entirely from a composite material, such as a 20 fiber reinforced composite plastic material, as shown in Figure 3. Since the composite hollow shaft 14 is fabricated with the aid of internal pressure, precise control of the inner dimensions of the composite hollow shaft 14 is difficult to achieve. Thus, the blade 25 cannot be secured to the hollow shaft 14 if the inner dimensions of the latter are too small, and the blade can only be loosely connected to the hollow shaft 14 if

the inner dimensions of the hollow shaft 14 are too large. In addition, composite materials are relatively expensive, thereby increasing the cost of the hockey stick. In the third type, the hollow shaft 15 is made from a composite material layer 151 which is wrapped around a metal hollow shaft 152, as shown in Figure 4. Regardless of whether shrink-forming or autoclave-forming is employed in the fabrication of the hollow shaft 15, since external pressure is applied when forming the hollow shaft 15, precise control of the degree of rounding of the four outer corners of the hollow shaft 15 cannot be achieved, thereby resulting in failure to provide a finished product which meets the specified dimensions and shape.

#### SUMMARY OF THE INVENTION

Therefore, the object of the present invention is to provide a hockey stick which includes a hollow shaft that does not have the aforementioned drawbacks of conventional hockey sticks.

Accordingly, the hockey stick of the present invention includes a blade with a heel portion, and a metal hollow shaft that extends upwardly from the heel portion of the blade. The hollow shaft has a rectangular cross-section and an outer surrounding wall surface with four corner portions, a pair of longer sides and a pair of shorter sides. At least one of the longer and shorter sides is formed with a

longitudinally extending recess that is disposed between a corresponding two of the corner portions and that receives fittingly a respective reinforcing strip, which is made of a composite material, therein.

5 DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Before the present invention is described in greater detail, it should be noted that like elements are denoted by the same reference numerals throughout the specification.

10 Referring to Figures 5 and 6, the first preferred embodiment of a hockey stick according to the present invention is shown to comprise a hollow shaft 20 which extends upwardly from a heel portion of a blade 40. The hollow shaft 20 is made from a drawn metal tube and has  
15 a rectangular cross-section. The hollow shaft 20 has an inner surrounding wall surface 22 which confines a rectangular hollow space 21 and an outer surrounding wall surface 24 with four corner portions 23, a pair of longer sides 241 and a pair of shorter sides 242. In  
20 this embodiment, each of the longer sides 241 is formed with a longitudinally extending recess 25 that is disposed between a corresponding two of the four corner portions 23. Each of the corner portions 23 is formed with a longitudinal retaining hook 251 that extends  
25 into a corresponding recess 25, as shown in Figure 7. A reinforcing strip 30 is fittingly received in each recess 25 and is retained therein by the retaining

hooks 251 of the adjacent corner portions 23. Preferably, the reinforcing strip 30 is formed as a laminated strip of fiber reinforced composite plastic material. The assembly of the hollow shaft 20 and the reinforcing strips 30 undergo shrink-forming or autoclave-forming so that the reinforcing strips 30 are secured in the respective recesses 25 and so that the reinforcing strips 30 are flush with the outer surrounding wall surface 24 of the hollow shaft 20.

Note that the strength-to-weight ratio of the hollow shaft 20 of the hockey stick of the present invention is higher than that of the metal hollow shaft found in a conventional hockey stick. The recesses 25 in the hollow shaft 20 reduce the weight of the hollow shaft 20, whilst the reinforcing strips 30, which are lighter than metal, serve to reinforce the hollow shaft 20 to strengthen the same. By varying the characteristics of the reinforcing strips 30, such as the number and the material of the laminated layers, the strength of the reinforcing strips 30 can be varied. Thus, hockey sticks with varying characteristics can be fabricated by merely installing different reinforcing strips 30 in order to suit the different needs of the consumers.

Unlike the composite hollow shaft of a conventional hollow stick, internal pressure is not required in the fabrication of the metal hollow shaft 20. Thus, precise control of the dimensions of the inner surrounding wall

surface 22 of the hollow shaft 20 can be easily achieved. In addition, since the corner portions 23 of the hollow shaft 20 are not covered by the reinforcing strips 30, precise control of the degree of rounding of the four corner portions 23 of the hollow shaft 20 can also be achieved with ease.

Figures 8 and 9 are sectional views of a hollow shaft 201, 202 of the second and third preferred embodiments of a hockey stick according to the present invention. In Figure 8, the recesses 25 are formed in the shorter sides 242 of the outer surrounding wall surface 24 of the hollow shaft 201. In Figure 9, the recesses 25 are formed in the longer and shorter sides 241, 242 of the outer surrounding wall surface 24 of the hollow shaft 202. Thus, the locations of the reinforcing strips 30 may be chosen so as to reinforce selected portions of the hollow shaft 20, 201, 202.

While the present invention has been described in connection with what is considered the most practical and preferred embodiments, it is understood that this invention is not limited to the disclosed embodiments but is intended to cover various arrangements included within the spirit and scope of the broadest interpretation so as to encompass all such modifications and equivalent arrangements.



## I CLAIM:

1. A hockey stick including a blade with a heel portion, and a metal hollow shaft that extends upwardly from said heel portion of said blade, said hollow shaft  
5 having a rectangular cross-section and an outer surrounding wall surface with four corner portions, a pair of longer sides and a pair of shorter sides, wherein:

at least one of said longer sides and said shorter  
10 sides is formed with a longitudinally extending recess that is disposed between a corresponding two of said corner portions and that receives fittingly a respective reinforcing strip, which is made of a composite material, therein.

15 2. The hockey stick as claimed in Claim 1, wherein each of said corresponding two of said corner portions is formed with a longitudinal retaining hook that extends into said recess for retaining said respective reinforcing strip in said recess.

20 3. The hockey stick as claimed in Claim 1, wherein said reinforcing strip is formed as a laminated strip of fiber reinforced composite plastic material.

4. The hockey stick as claimed in Claim 1, wherein each of said longer sides is formed with said recess.

25 5. The hockey stick as claimed in Claim 1, wherein each of said shorter sides is formed with said recess.

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6. The hockey stick as claimed in Claim 1, wherein each of said shorter and longer sides is formed with said recess.

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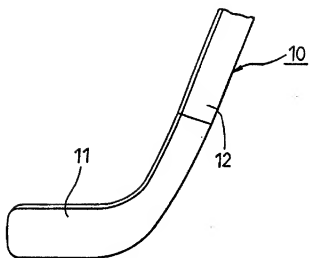


FIG. 1  
PRIOR ART

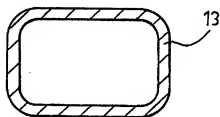


FIG. 2  
PRIOR ART

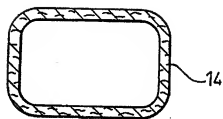


FIG. 3  
PRIOR ART

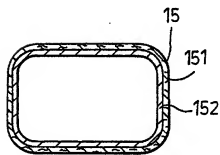


FIG. 4  
PRIOR ART

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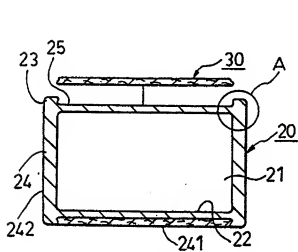
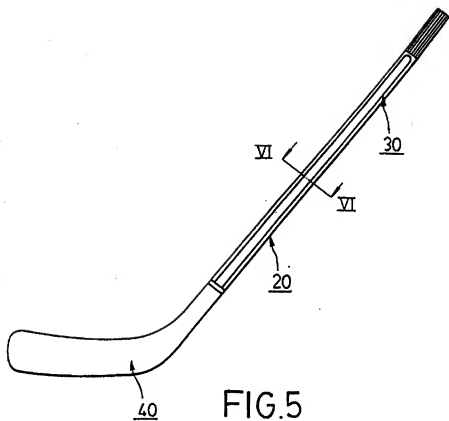


FIG. 6



FIG. 7

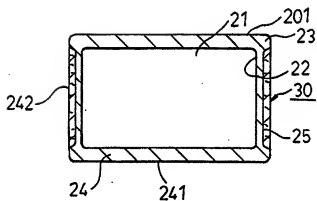


FIG. 8

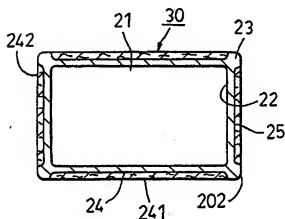


FIG. 9